

What is claimed is:

1. An internal combustion engine system comprising:

an air intake system;

an exhaust system;

an exhaust gas recirculating line having an inlet from the exhaust system and an outlet into the air intake system;

a compressor system in the exhaust gas recirculating line for drawing exhaust gas from the exhaust system and boosting exhaust gas pressure for delivery to the air intake system; and

means for recovering vehicle kinetic energy and storing the vehicle kinetic energy as potential energy for driving the compressor system in the exhaust gas recirculating line.

2. An internal combustion engine system as set forth in claim 1, further comprising:

the air intake system including a charge air boost system for raising the pressure of air in the air intake system;

the exhaust system including an exhaust turbine coupled to drive the charge air boost system, the exhaust turbine further having an inlet for receiving exhaust gas from the engine and an outlet into an exhaust pipe for discharge to the environment; and

the exhaust gas recirculating line having its inlet from the exhaust system connected to the exhaust pipe downstream from the outlet from the exhaust turbine.

3. An internal combustion engine system as set forth in claim 2, further comprising:

the exhaust gas recirculating line being sufficiently long to provide substantial exhaust gas cooling prior to introduction of the exhaust gas to the air intake system.

4. An internal combustion engine system as set forth in claim 3, further comprising:

the air intake system having an intercooler downstream from the charge air boost system and an intake manifold between the intercooler and the engine; and

the outlet from the exhaust gas recirculating line into the air intake system is downstream from the intercooler and ahead of the air intake manifold.

5. An internal combustion engine system as set forth in claim 4, the compressor system further including:

a variable output electrically driven compressor; and

a fixed diameter return orifice between the compressor and the outlet to the air intake system.

6. An internal combustion engine system as set forth in claim 4, the compressor system further including:

an electrically driven compressor; and

a metering valve coupling the outlet of the compressor to the air intake system.

7. An internal combustion engine system as set forth in claim 4, the means for recovering kinetic energy further comprising:

a battery charging system coupled for energization to the engine; and

a battery coupled to the battery charging system for storing electricity.

8. An internal combustion engine system as set forth in claim 7, the compressor system further comprising an electrical motor coupled for energization to the battery and battery charging system.

9. An internal combustion engine system as set forth in claim 8, further comprising:

an engine controller responsive to detection of transient operating conditions consistent with demands for pressure on the engine for energizing the electrical motor from the battery.

10. An internal combustion engine system as set forth in claim 9, wherein the internal combustion engine is a compression ignition engine.
11. An internal combustion engine assembly comprising:
- an intake manifold;
 - a turbocharger having a combustion air intake, an exhaust gas outlet and a compressed intake air outlet coupled to the intake manifold;
 - an exhaust gas recirculating line fluidically coupled to the exhaust gas outlet of the turbocharger and further coupled to the intake manifold to return exhaust gas to the intake manifold; and
 - a compressor in the exhaust gas recirculating line for pressurizing the exhaust gas.
12. An internal combustion engine assembly as set forth in claim 11, further comprising:
- an extended exhaust pipe coupling the exhaust gas outlet from the turbocharger to the exhaust gas recirculating line.
13. An internal combustion engine assembly as set forth in claim 12, further comprising:
- a battery;

a charging system coupled to the internal combustion engine assembly for energization and electrically coupled for returning charge to the battery; and

the compressor being electrically energized from the battery responsive to transient conditions.

14. An internal combustion engine assembly as set forth in claim 13, further comprising:

a metering valve coupling the compressor to the intake manifold.

15. An internal combustion engine assembly as set forth in claim 14, further comprising:

an engine controller for energizing the electrically driven compressor and coupled to the metering valve for the control thereof.

16. An internal combustion engine assembly as set forth in claim 13, further comprising:

the compressor having a controllable output.

17. A motor vehicle comprising:

an internal combustion engine having an intake manifold and an exhaust manifold;

an exhaust turbine coupled to the exhaust manifold;

a supercharger connected to be driven by the exhaust turbine and coupled to boost charge air to the intake manifold;

an exhaust pipe extending from the exhaust turbine; and

an exhaust gas recirculating conduit including a exhaust gas compressor disposed in the exhaust gas recirculating conduit, the exhaust gas recirculating conduit being connected to the exhaust pipe to draw gas from the exhaust pipe and to boost the gas into the intake manifold.

18. A motor vehicle as set forth in claim 17, further comprising:

A NO_x emission reducing system in the exhaust pipe; and

the point of connection between the exhaust gas recirculating conduit and the exhaust pipe being downstream from the NO_x emission reducing system.

19. A motor vehicle as set forth in claim 18, further comprising:

an electrical supply system powered by the internal combustion engine and including an electrical power storage device;

the compressor being electrically driven; and

means responsive to engine load for energizing the compressor from the electrical power storage device.

20. A motor vehicle as set forth in claim 19, further comprising:
- an intercooler coupling the charge air from the supercharger to the intake manifold; and
- the exhaust gas recirculating conduit being coupled to deliver boosted exhaust gas to the intake manifold downstream from the intercooler.